

# Transitioning North American Energy Independence USCG/D8 View

*USCG Eighth District Dec 2016*

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## Overview

North American energy commerce is thriving with dramatic increases to energy production and transportation. A maritime nation, the United States depends on the seas and inland waterways for economic prosperity and security, both of which are intertwined and face evolving challenges.

With lead Federal responsibility for ensuring the safety, security, and stewardship of the Nation's waters, the Coast Guard must have the capabilities to enable Coast Guard men and women to do their jobs in an inherently dangerous environment. Continuing growth in global energy trade, increased use of the seas and inland waterways, and the demand for strong maritime governance demands a U.S. Coast Guard that is Always Ready.

The Coast Guard protects the Nation's scarce marine resources, and enables the safe exploitation of mineral and energy resources in the territorial sea, Exclusive Economic Zone (EEZ), and continental shelf.

The United States relies on its ports and coastal and inland waterways as safe avenues of trade and transportation for the majority of U.S. global commerce, fueling America's economy. However, with the continuous expansion of the North American energy market, U.S. ports, inland and coastal waterways, and offshore zones are vulnerable to illicit activities, manmade disasters, and other threats. The U.S. Marine Transportation system IS national critical infrastructure.

The Coast Guard is central to solutions that address commercial, environmental, and security concerns. Safeguarding North American energy commerce is a national imperative and a key priority to our Western Hemisphere Strategy. The Coast Guard's enforcement of U.S. and international maritime law is imperative to ensuring the North American transition to energy independence is sustained.

## Energy Growth Components

**Shore Infrastructure Component.** Inexpensive domestic natural gas drove extraordinary investment in the expansion and development of waterfront facilities between 2014 and 2016; particularly facilities that export Liquefied Natural Gas (LNG), Liquefied Hazardous Gas (LHG), and other petrochemical products. In the Houston-Galveston AOR alone, there are 26 active projects which represent approximately \$156 Billion in energy sector growth. While gas-derived products such as LNG, LPG, and nitrogen fertilizer used to be imported, those products are now domestically produced in new marine facilities with U.S. Jones Act compliant vessels providing transport. By 2019, the GOM will see ethylene, methanol, and ammonia-urea production increase by 35 million metric tons per year.

Natural gas production increased from 2 percent of domestic gas production in 2001 to 40 percent in 2015 with nearly 30 billion cubic feet produced each day. The U.S. is the world's largest natural gas

producer and will fulfill the global demand for liquefied gas by expanding production facilities with over 30 liquefaction facilities seeking permits to export to the world.

**Offshore Production Component.** Outer Continental Shelf (OCS) production is resilient to oil price fluctuations. There are currently over 40 companies with bids covering nearly 100,000 acres on the OCS worth nearly \$600 Million. Further, by January 2017 monthly oil production will reach 1.7 million barrels per day, a production value not equaled since January 2010. Even while reduced investment into exploration reflects current oil prices, production is directly correlated with output of the oil field. In other words, production of oil is contracted to exploit 100% of the oil field's yield, each life cycle lasting between 30 and 40 years. Production, therefore, remains strong, is a reliable steady-state indicator of consumer consumption, and will outlive boom/bust cycles.

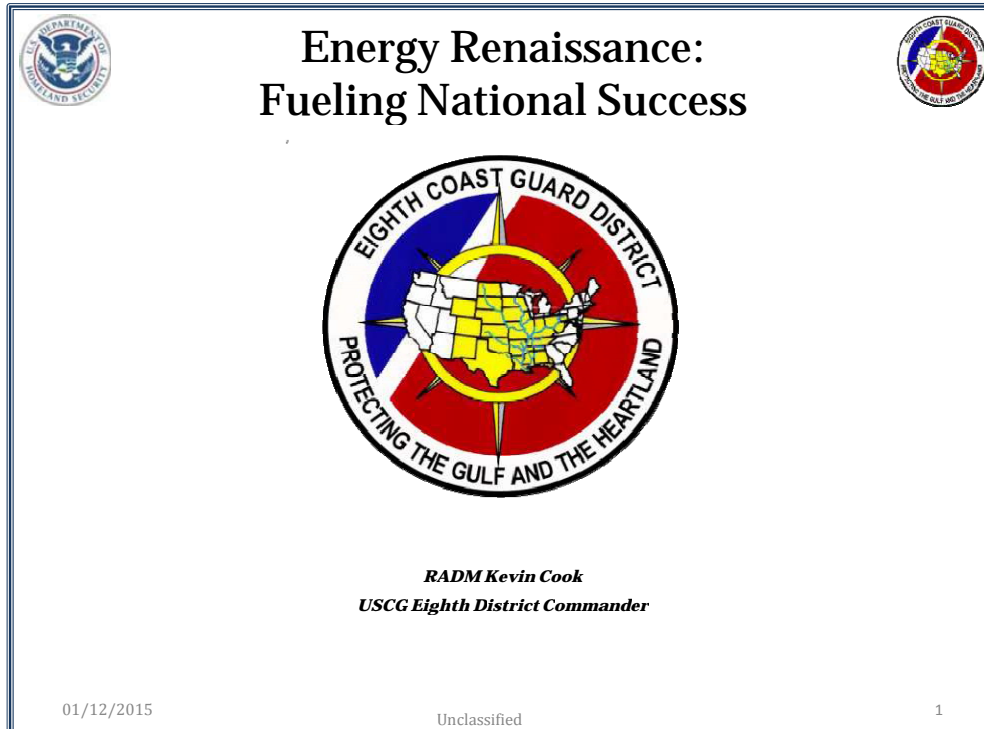
Furthermore, U.S. oil production, regardless of short term boom and bust prices, doubled since 2008, producing more than 9 million barrels each day, matching production levels not realized since the early 1970s. It is forecasted that domestic crude oil production will surpass both Russia and Saudi Arabia in oil production before 2020.

Marine (offshore) production carries enormous risk. A serious incident can result in an uncontrolled subsea spill, explosion/death, and disrupted production. Offshore production (1/5 of US total) resists price fluctuation transients; it rose during oil price downturn while US overall production slightly decreased. Price transients drive cyclical risk in exploration required to maintain production, however. Massive fleets of drilling and support vessels "unstack" with minimally trained personnel (cut during downturn) when oil prices rise. It takes years to achieve a rapidly adaptable regulatory structure and highly skilled, flexible OCS workforce and sustained organizational commitment to maintain.

**Marine Transportation Component.** Shipping crude by barge more than doubled between 2003 (164 million barrels per day) and 2013 (345 million barrels per day). Crude oil from the Bakken area of North Dakota, for example, is shipped via pipeline or rail to shore-based facilities in Portland, OR, St. Louis, MO, and Albany, NY, and is transferred to barges for transportation down the Columbia, Mississippi, and Hudson Rivers to over 35 refineries in Oregon, Washington, Louisiana, and Philadelphia. In the early 2000s, the Mississippi River oil-by-barge trade consisted of less than 100 red flag barges. Today, single companies operate 500-900 inland red flag cargo barge fleets and employ tens of hundreds of employees to manage the drastic increase of crude oil transportation.

The massive U.S. fleets built during the boom of the last 10 years are now in our MTS, stressing its capacity. They did not go away with the drop in oil prices and our oversight responsibility for them has dramatically increased with the publication of subchapter M. We still move significant amounts of oil to consumers on our waterways because demand has increased and shale production has only started to drop. High production levels from OPEC's attempt to kill U.S. shale oil is unsustainable; shale oil will quickly ramp up and we'll see more oil moved on our MTS than 2014 because demand is higher.

North American petroleum production dramatically grew with the increased use of nontraditional energy production technology, including directional and horizontal drilling, and hydraulic fracturing used to access formations in North Dakota, Texas, Colorado, Florida, and Pennsylvania. The nation's infrastructure and pipeline carrying capacity was overwhelmed. As a result, these products are now being transported by rail cars, tanker trucks, and barges to downstream and coastal refineries. Navigable waterways are likewise affected with significant increased use of the MTS due to transportation of new cargoes, marine fuels, and increased movements of gas carriers.



## Cover Slide

Let's discuss the Energy Independence. You've already heard about the Energy Independence – but what I want to do is talk about what is new or changing and what we need to be prepared despite the fluctuating oil prices.

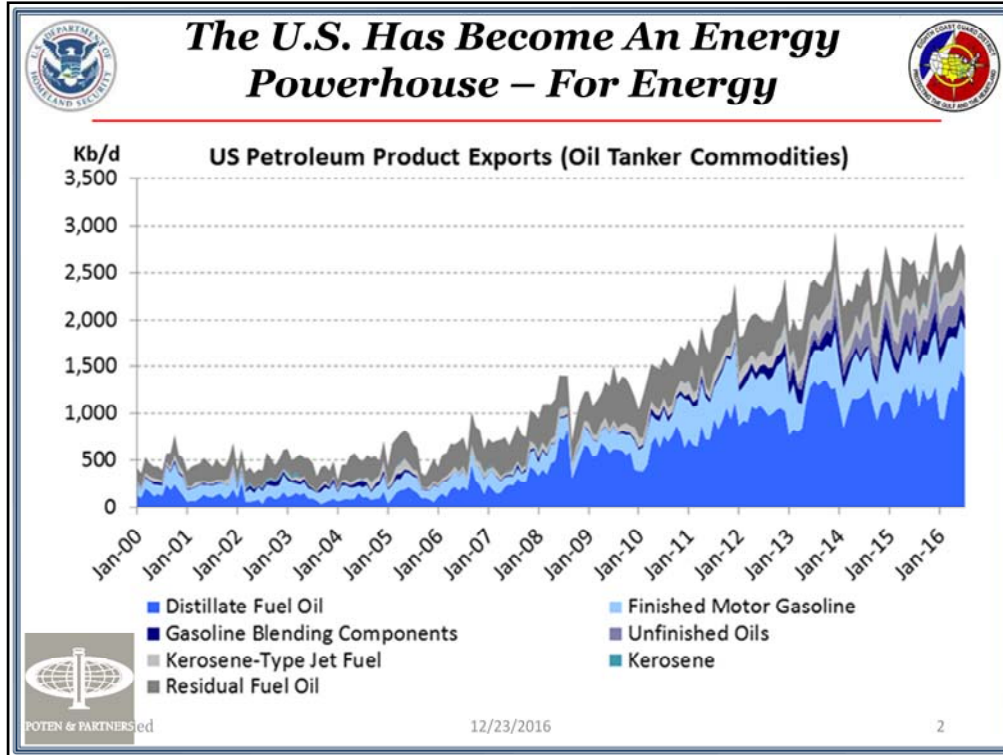
The Coast Guard has an important role in the oversight of vessels participating in every aspect of energy growth, changes, and energy related industries from inland barge tows to new and innovative craft conducting drilling and production offshore and everything in between.

The related geopolitical issues play out in the constant news feed provided through multiple news sources every day.

The Energy Renaissance Action Plan is directly tied to the Coast Guard's Western Hemisphere Strategy's key priority to safeguard commerce.

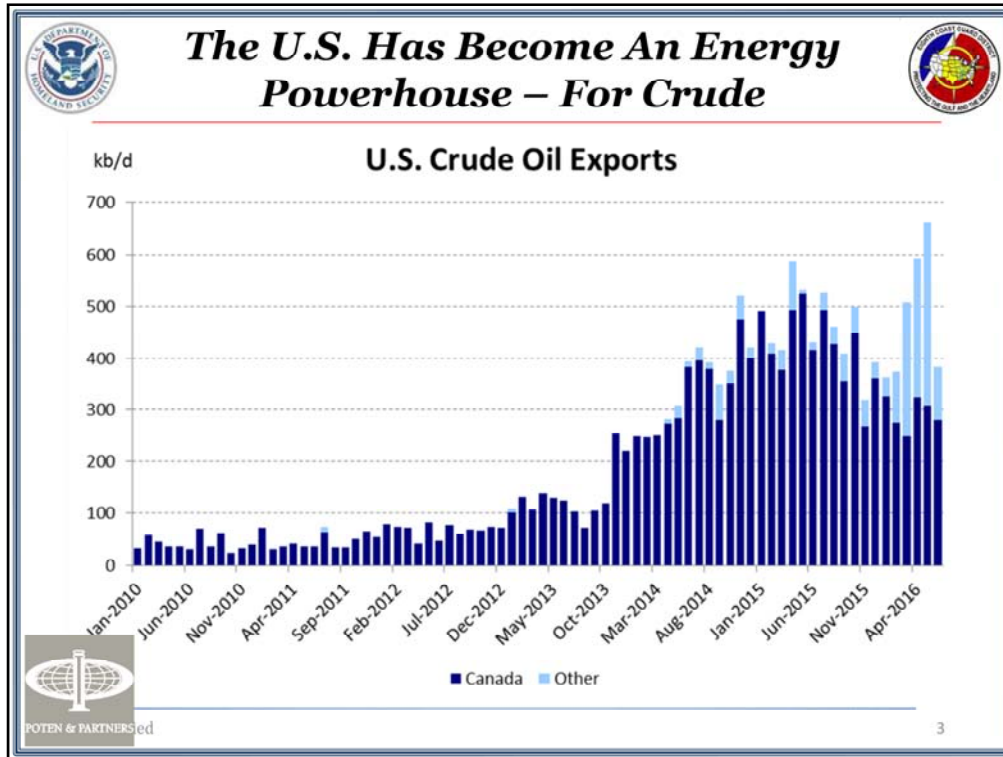
The U.S. is moving towards energy independence which is directly tied to economic security. We must look beyond the boom-bust cycles in oil price and focus on the long term maritime impact of a sustained increase in North American Energy Production.

The inland, coastal and global Marine Transportation System (MTS) is one of the most efficient means to move bulk energy products. The Outer Continental Shelf (OCS) has massive oil and gas reserves. The Coast Guard is responsible for facilitating commerce and

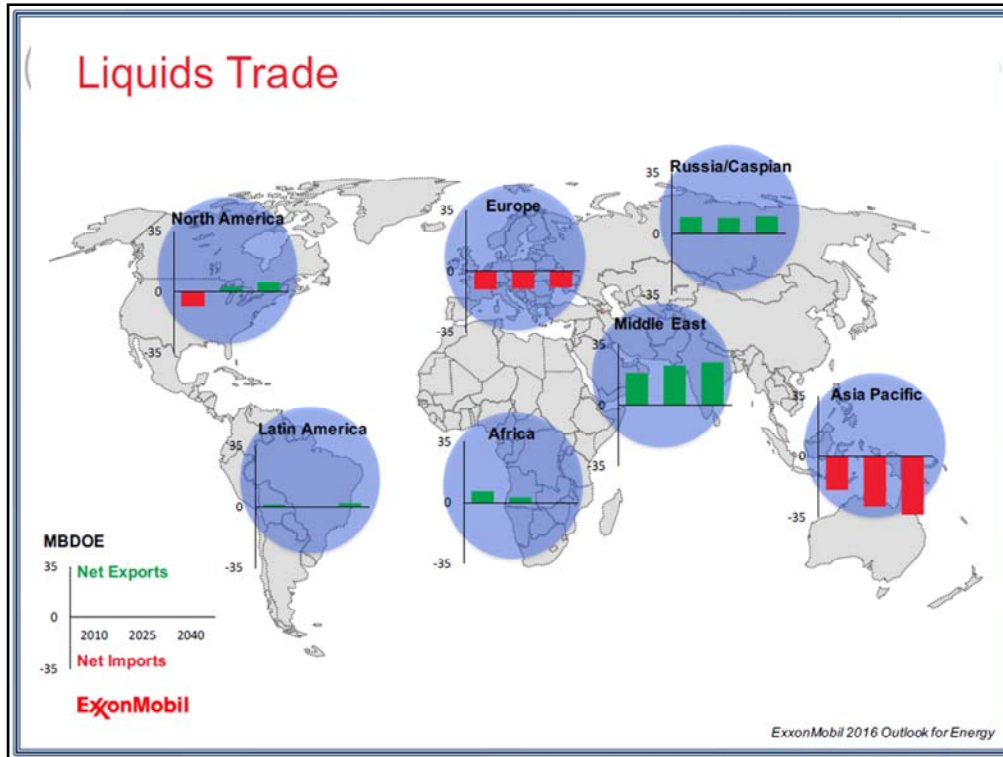


U.S. refineries are mostly designed to process heavy (rather than light) crudes. Essentially, all current and projected increases in U.S. crude production have been in light sweet crude, meaning that the U.S. has much to gain by exporting this light crude.

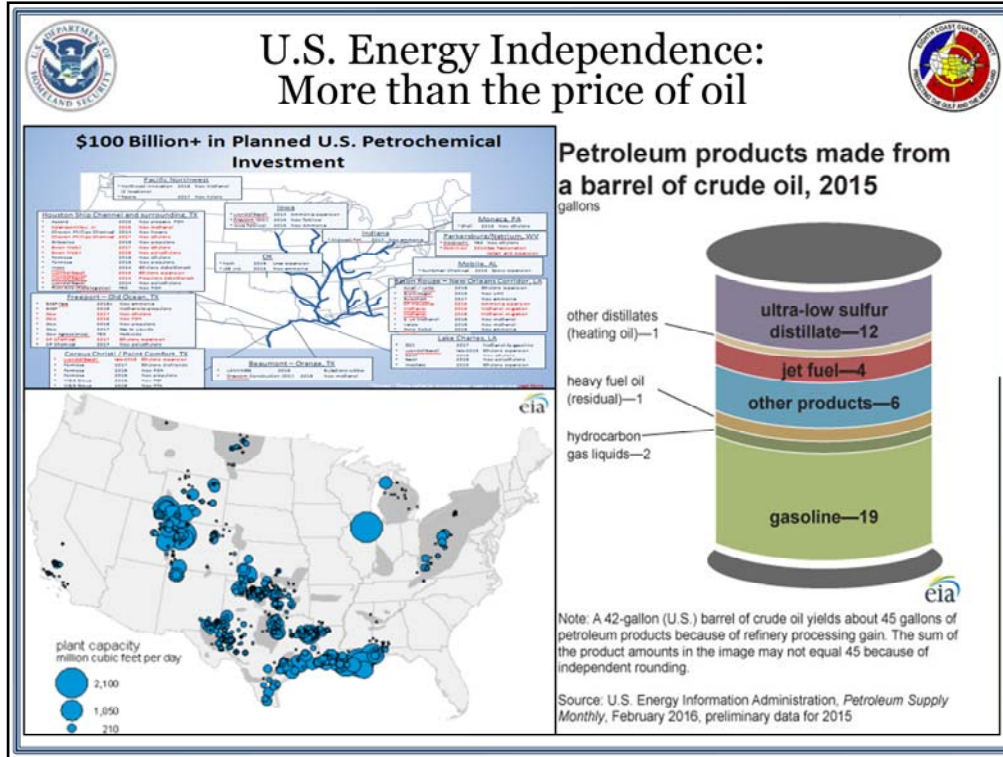
U.S. is nearing the point where rapid production growth of light sweet crude exceeds the ability of our refining system to economically process it. Thus, exporting light sweet crudes and importing heavier crudes better aligns existing refinery configurations with crude type.



Main Point: Long-term, even conservative estimates – such as the energy companies outlooks, or DOD 2012 Joint Operating Environment study – identified a significant increase in world-wide energy demands by 2040. We expect to see production in new locations with the potential for moving oil and gas in and around U.S. inland and coastal waterways.



Production is thus far independent of price per barrel. Growth in the middle class and a growing global demand is directly correlated with increased demands for energy. Crude oil exports are forecasted to reach almost 2 million barrels per day, equating to 3-4 additional foreign tankship transits per day.



Main Point: While LNG gets a lot of the press, the petrochemical industry is booming.

In September 2015, looking at one product area: Propane and Propylene: [U.S. propane inventories are at an all-time high](#). Cheap Four projects (from Dow, ExxonMobil, Chevron Phillips, and OxyChem/Mexichem) are already under construction, and two projects (from Formosa and Sasol) have received permitting approval and commitments from investors. Together with capacity expansions at existing facilities, these six new facilities are expected to increase U.S. ethylene production by 40%

Two aspects to LNG: (1) LNG energy and (2) LNG as a new marine fuel source.

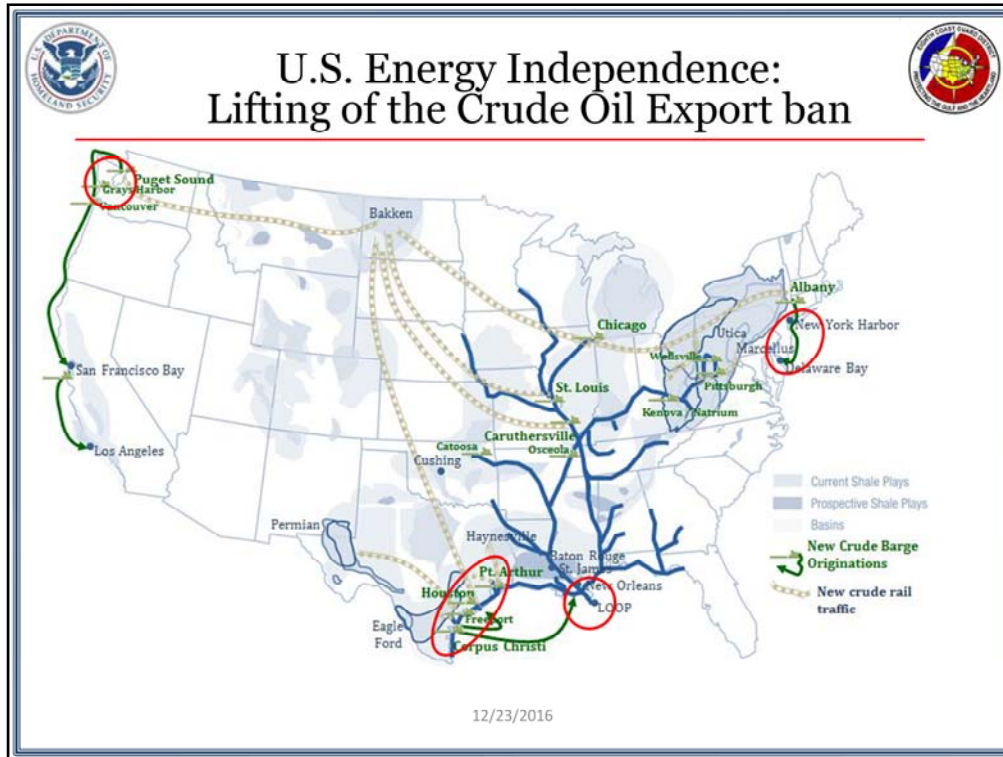
Liquefaction on the scale proposed presented a new paradigm for the United States and its regulatory agencies.

Huge infrastructure investments have been made ~\$31B.... Cheniere is the largest construction project in the United States

Cheniere will be the largest capacity buyer of natural gas in the U.S. and one of the largest pipeline capacity holders

- Entered into 20 year contracts with customers in Asia.
- Approximately 7% of the natural gas produced in the U.S. will supply the liquefaction trains at Sabine Pass and Corpus Christi

LNG as a fuel highlights one of many new innovations that we must develop the competency to oversee. OSV HARVEY POWER pictured here arrived in Port Fourchon, LA on 06 Oct to conduct LNG bunkering and sea trials in preparation for final inspection and issuance of initial COI. The vessel was constructed in Gulfport, Mississippi and is the 2nd LNG-fueled OSV to be delivered in the U.S. We expect the Harvey facility to complete construction first LNG marine fueling facility in the U.S. that will be in operation in the next few weeks.



Main Point: There is a lot of speculation about the impact of lifting the Crude Oil Export ban. Regardless of the economic impact – it most certainly will lead to increased maritime traffic both on the inland and coastal waterways.

What does lifting the Export Ban mean in terms impact to the MTS? Increased production could see inland crude oil barge traffic returning to peak levels or even greater – obviously dependant on pipeline capacity.

Crude oil exports could potentially reach almost 2 million barrels per day...that could equate to 3-4 additional foreign tankship transits per day. The red circles show areas where we could potentially see crude oil exported:

Eagle Ford/Permian oil could go to Houston/Galveston and Corpus Christi or even be pumped over to the LOOP.

Utica/Marcellus oil could go to New Orleans/LOOP (rail, pipe & barge) and New York (rail & barge).

Bakken oil could go to New Orleans/LOOP (pipe & barge), New York (rail & barge), and potential to Seattle.


Port of Houston has even speculated that industry might look to use larger tankships to move crude oil because it is more economical...with that would come transit restrictions....and create additional strain on the MTS.

We need to be thinking of the second and third order consequences. One scenario - lifting the export ban for crude oil from the US could to have negative impact on the Jones Act tanker market, as smaller amounts of commodities will have to be moved...the negative impact could be to the green lines that depict New/Current Crude Barge routes that resulted from the increased US production. There claim is that this is offset by more jobs and economic development from continued growth in U.S. oil production.


Cons: Less economic justification for condensate splitters and topping units and Potential for fewer refined products and refined product exports.

History - The ban was a companion policy to U.S. oil price controls, which were ended in 1981.





## Marine Transportation Demand Drivers



Markets and Products Moved	Products	Drivers
Petrochemicals and Chemicals	Benzene, Styrene, Methanol, Acrylonitrile, Xylene, Caustic Soda, Butadiene, Propylene	Consumer non-durables – 70% Consumer durables – 30%
Black Oil	Residual Fuel Oil, Coker Feedstock, Vacuum Gas Oil, Asphalt, Carbon Black Feedstock, Crude Oil, Ship Bunkers	Fuel for Power Plants and Ships, Feedstock for Refineries and Road Construction
Refined Petroleum Products	Gasoline, No. 2 Oil, Jet Fuel, Heating Oil, Diesel Fuel, Naphtha, Ethanol	Vehicle Usage, Air Travel, Weather, Refinery Utilization
Agricultural Chemicals	Anhydrous Ammonia, Nitrogen-based Liquid Fertilizer, Industrial Ammonia	Corn, Cotton, Wheat Production, Chemical Feedstock Usage

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Main Point: Even though the price of oil is down, the petrochemical industry is booming. The petrochemical industry uses hydrocarbon feedstocks such as ethane and propane to create plastics, fibers, resins, and a wide range of other consumer and industrial materials.

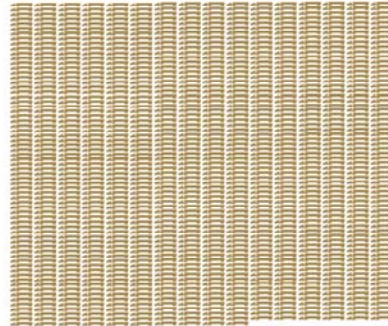
This slide gives you some examples of what the petroleum products are used for in our daily lives.

## One 15-Barge Tow Equals 216 Rail Cars or 1,050 Trucks

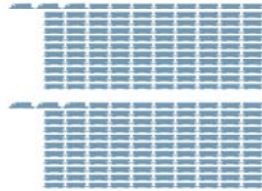
One 15-Barge Tow



1,050 Large Semi Tractor-Trailers

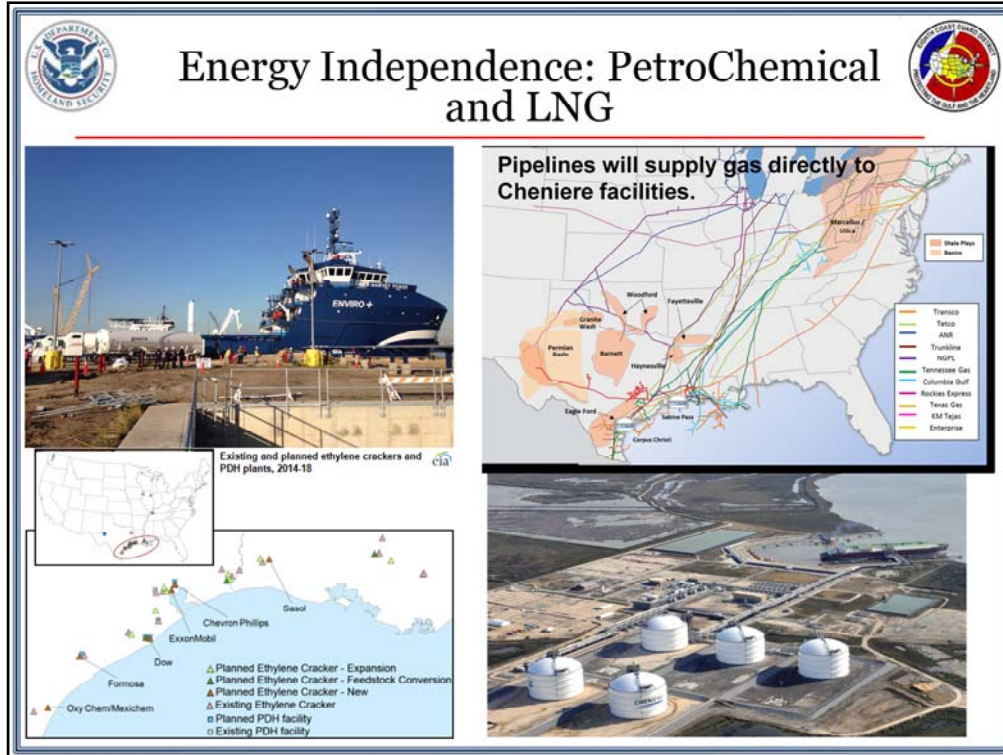


216 Rail Cars + 6 Locomotives



Due to exports, waterway routes are increasing; as opposed to highways and railways which are at capacity. River barge transportation is extremely efficient especially for the movement of large quantities of lower value dry bulk commodities such as grain and coal where profit is measured in sheer value which is able to be moved. This same efficiency also holds true for bulk liquids including petroleum products, chemicals, fertilizers and edible alcohols and oils.

A recent report by the National Waterways Foundation indicates that a common 15-barge tow of dry cargo has the equivalent capacity of 216 rail cars and six locomotives, or 1,050 tractor-trailers.



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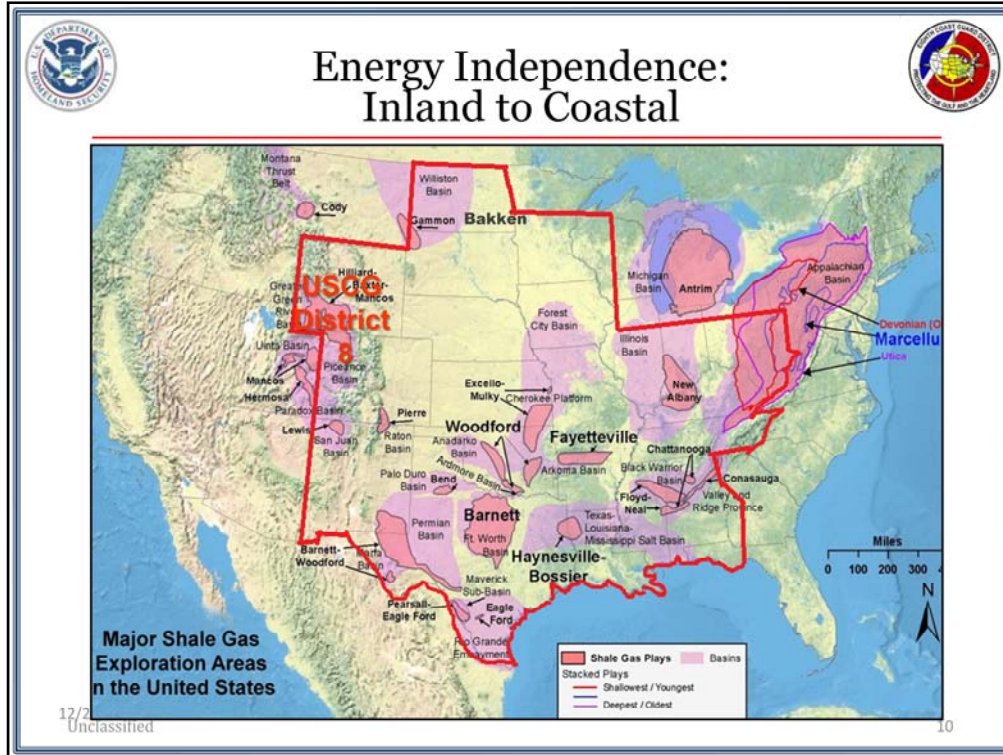
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**Energy Independence - Inland and Coastal**

“U.S. shale production could grow from 4.5 million barrels a day in December to over 5 million end of next year, Citigroup Inc. said in a report Monday.

Following news of the OPEC agreement, EIA on Dec. 6 revised its 2017 U.S. production forecast to 8.78 million barrels a day from 8.73 million. U.S. oil rig counts also rose by 21 to 498 in the week ended Dec. 9.” <https://www.bloomberg.com/news/articles/2016-12-12/u-s-sees-higher-shale-output-first-time-in-six-months-on-opec>

Many have heard of the Marcellus but there are many plays producing varying grades of oil and natural gas right here in the heartland and near the gulf coast.

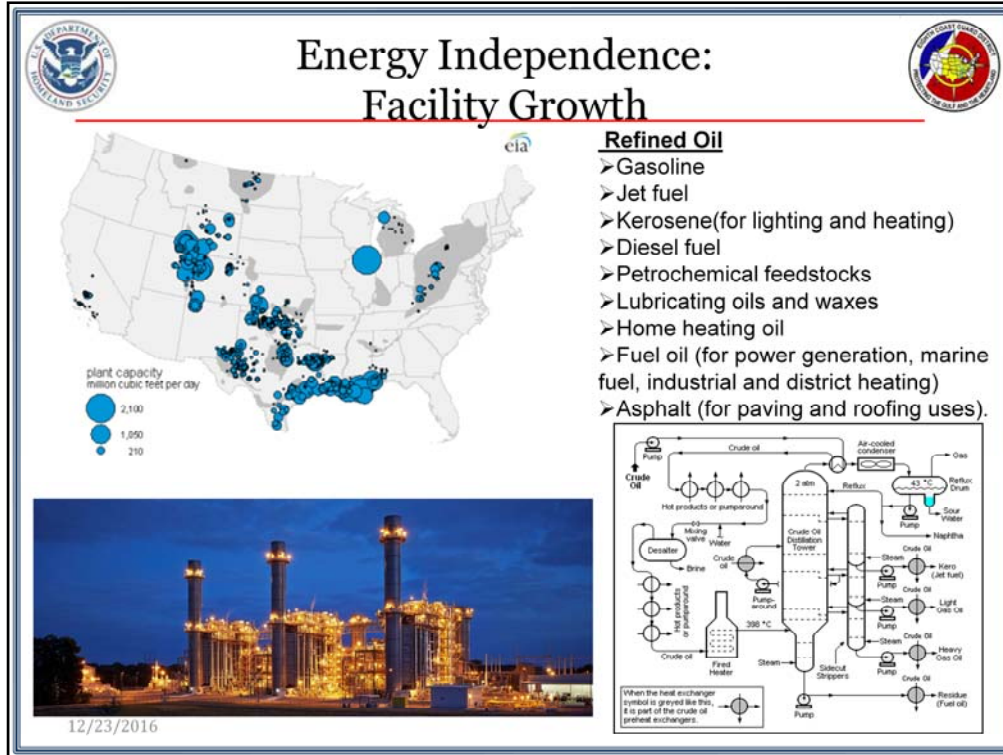
The Bakken and the Eagle Ford = the 2 largest producers - the number of producing rigs has decreased from the height of 250 in the fall of 2014, but is currently stabilizing at 150 showing an equilibrium through the second quarter of 2015.

Corpus Christi has seen increase in domestic transfers from 135K bpd in 2012 to 529K bpd in 2014.

Data from Energy Information Administration

<http://www.eia.gov/petroleum/drilling/>

[http://www.eia.gov/pressroom/presentations/sieminski\\_07242014.pdf](http://www.eia.gov/pressroom/presentations/sieminski_07242014.pdf)



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So, again we understand that there is \$100 Billion+ in planned US PetroChem investment.

This means far more than oil alone – the current price of oil allows for the efficient advancement of many industries that rely on various refining processes and streams that begin with oil but end with necessary fuels and products for every day life – from jet fuel to soar the skies to asphalt paving our roads . . .

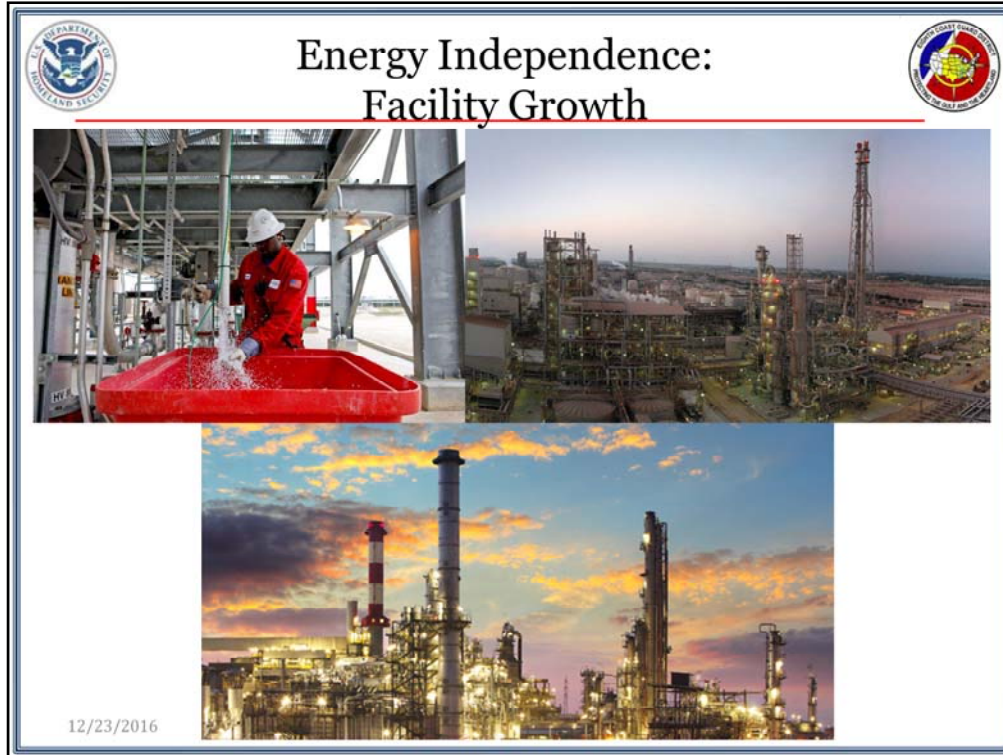
Of these, the transportation fuels have the highest value; fuel oils and asphalt the lowest value.

Many refined products, such as gasoline, are produced in multiple grades, to meet different specifications and standards (e.g., octane levels, sulfur content).

Various facilities, including LNG and Condensate export facilities, will multiply along the coastal regions to get the right product to market at the right price,

[http://www.theicct.org/sites/default/files/publications/ICCT05\\_Refining\\_Tutorial\\_FINAL\\_R1.pdf](http://www.theicct.org/sites/default/files/publications/ICCT05_Refining_Tutorial_FINAL_R1.pdf)

<http://www.eia.gov/todayinenergy/detail.cfm?id=8530>



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Plastic plant in Pasadena TX – Petroleum gases – more than just fuel - oil produced from shale is becoming the catalyst for American manufacturing.

Fertilizer plant - high demand for fertilizer plants in the US → consequence of the shale gas boom - Fertilizers are a relatively quick way of turning gas into money

Chemical plant – petrochemicals used in everyday life processed from oil that wont stop producing.

**This commercial from Exxon Mobile helps put it into perspective showing energy as “enabling everyday life”**

**<http://corporate.exxonmobil.com/en/company/multimedia/energy-lives-here/enabling-everyday-life?parentId=ac233f6f-4451-4390-a2d2-f055fd95b87c>**

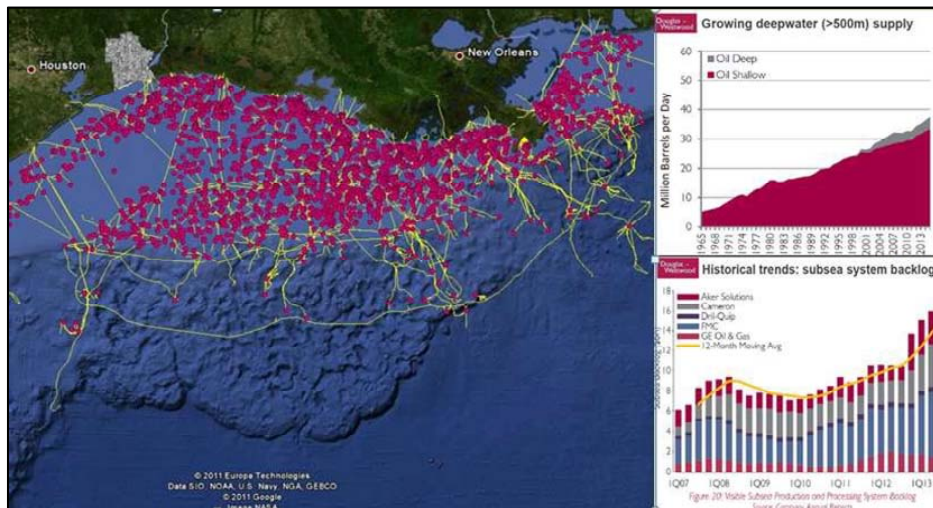
<http://archive.freeenterprise.com/energy-environment/energy-boom-fuels-american-manufacturing>

<http://www.icis.com/resources/news/2013/04/13/9658384/market-outlook-shale-gas-boom-fosters-growth-for-fertilizers/>

<http://lca.org/products/>



# Energy Renaissance: Offshore



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Coastal to Offshore

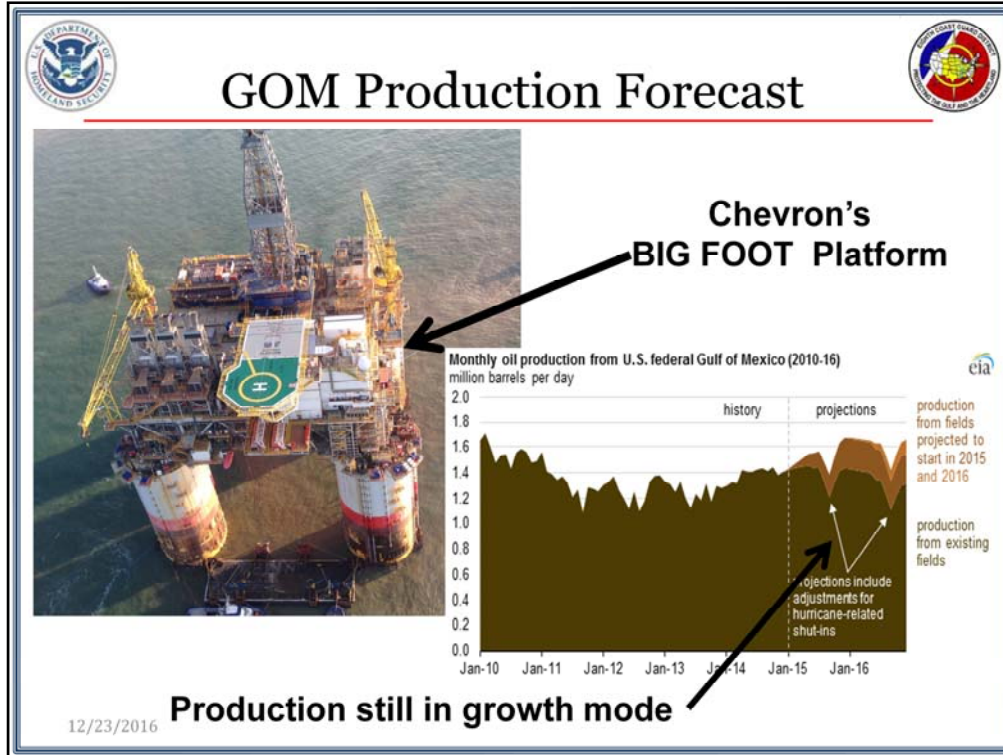
The numbers speak for themselves:

4000 facilities with new on the way

40+ plus year production lives

30,000 people out there on any given day

2000 helo flights / 2.2 million air pax per year



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First we see Chevron's BigFoot Platform on its way to the Gulf . . .

Then the chart shows that production appears independent of price per barrel – still predicting increase in production - growth

Other Growth:

Unprecedented growth in the middle class, growing a global population that relies on and demands energy.

In March, 2015, a total of 42 companies submitted 195 bids on 169 tracts, covering about 923,700 acres on the Outer Continental Shelf in the Central Gulf of Mexico.

Bids received totaled \$583,201,520.

"While this sale reflects today's market conditions and industry's current development strategy, it underscores a **steady, continued interest in developing these federal offshore oil and gas resources,**" said Secretary of the Interior Sally Jewell, who opened the lease sale.

<http://www.worldoil.com/news/2015/3/18/central-gulf-of-mexico-lease-sale-yields-539-million-in-high-bids>





# Impacts: Waterway Congestion



- Energy Independence Act of 2007
- Established Marine Highway System (D8 routes in red)
- Reduce landside congestion
- Oil moved from heartland to refineries
- Collisions / spills close MHS
- Vessel Traffic Services Strained
- More Incident Management

02/06/2015

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Bottom line: Energy Independence equates to increased pressure/risk on America's waterways/MTS with increased vessel traffic, larger vessels, expanded drilling on the OCS, and increased facility infrastructure along the Nations finite waterways. It is important to recognize the MTS as national critical infrastructure.

Impacts – Increased WW Congestion based on energy growth realized after the spike in oil prices coupled with the oil shale boom likely to be repeated in the future as the United States becomes more energy independent.

The Energy Independence has stressed our nation's finite waterways and infrastructure increasing risk to not only the environment and public safety but also the loss of productivity through disruption of "just in time" supply chains.

In 2007, Congress passed the Energy Independence Act, committing us to revitalizing our maritime transportation system. They charged MARAD with promoting the "Marine Highway System" The left portion of the slide is the MARAD depiction from their 2011 report to Congress; the portions of the "Marine Highway System" in D8 are highlighted red.

Energy Independence (i.e. Bakken/shale oil) has increased the potential for oil and gas to move from our Heartland to the coast along our inland river system, a 180 degree reversal from the traditional norm.

The situation has flipped in the refineries. They receive crude domestically and export refined product. We no longer see big oil and gas tanker imports, but product and gas exports. This is why all the LNG export terminals are being approved.

Where exporting is taking over the waterway routes are picking up where highways and railways are at capacity or by offering better transportation solution.

Increased stress on VTS model

Increased threat of pollution by increased number of various and new cargos/products – various crude types, chemicals, waste water, sand, snails



# DISCUSSION



***RADM Kevin Cook***  
***USCG Eighth District Commander***

01/12/2015

Unclassified

Discussion

# U.S. Coast Guard Prepares for America's Energy Renaissance

*The U.S. Coast Guard plays a critical role in America's Energy Renaissance by patrolling and managing waterways, setting standards, conducting inspections, and preparing for and responding to spills and other incidents.*

Offshore and inland domestic oil and gas production has hit record levels and will continue to grow through future decades. The corresponding increased demand on the U.S. Marine Transportation System (MTS) to support the production and transportation of oil and gas, refined products and chemicals, and related manufactured goods will challenge the U.S. Coast Guard's capacity to ensure safety, security, and environmental stewardship in a way that will allow our nation to enjoy the full economic benefit of this American Energy Renaissance. In the face of this increased demand the Coast Guard will continue to leverage our multi-mission workforce and operationally flexible assets to mitigate risk by actively patrolling and managing waterways; conducting inspections of vessels, cargo and port facilities for compliance with safety, security, and environmental standards; preparing for and responding to incidents and conducting investigations. Working with our interagency and international partners and all stakeholders, the Coast Guard must ensure that our governance, oversight, and operational approach to prevention, preparedness, and response remain effective, efficient, and relevant to the state of technology and level of activity.

## Changing Realities

### Significant Growth in Domestic Energy Production

Driven primarily by advances in technology that allow for more efficient and effective exploitation of previously inaccessible oil and gas reserves, the United States energy industry is experiencing significant growth for the first time since domestic oil and natural gas production peaked in the 1970s. In October 2013, the U.S. produced more oil than it imported for the first time in twenty years.<sup>1</sup> During the first quarter of 2014, the U.S. became the world's largest producer of both

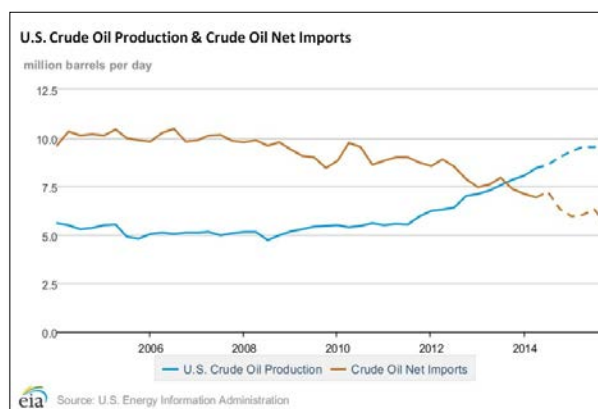


Figure 1 - Demonstrates increase in U.S. crude oil production and decrease in crude oil net imports.

<sup>1</sup> <http://www.whitehouse.gov/energy/securing-american-energy>

hydrocarbon liquids (crude oil, condensate, and natural gas liquids) and natural gas.<sup>2</sup> The U.S. now produces 14 percent of the world's hydrocarbon liquids and 20 percent of its natural gas. The U.S. production is predicted to continue rising through 2019 and may exceed current forecasts with continued growth into the future.

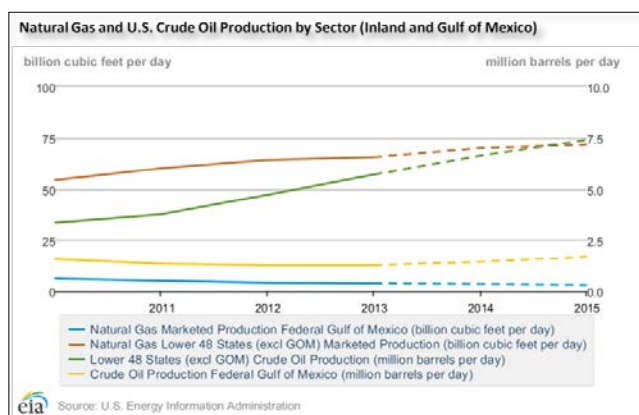
Increased U.S. oil and gas production and the associated by-products, for example liquified hazardous gases (LHG), provide competitively priced feed stock for other U.S. industries, particularly petrochemical manufacturers. As of February 2014, the U.S. chemical industry had announced 148 new investment projects, valued at \$100 billion. These investments will come online through 2020 and are projected to increase U.S. chemical exports by more than 45 percent.<sup>3</sup> This investment is not limited to inland waterways and the Gulf Coast as evidenced by 12 percent increase in petroleum product transits on the Saint Lawrence Seaway between 2013 and 2014.

### Oil and Gas Production on Outer Continental Shelf (OCS)

After several years of decreased output following the Deepwater Horizon incident, offshore oil and gas production has dramatically increased on the OCS in the Gulf of Mexico. Deepwater drilling continues to proliferate and now accounts for 80 percent of total Gulf output.<sup>4</sup> Meanwhile, shallow water oil fields continue to be exploited by smaller independent producers.



The Gulf of Mexico accounts for 30 percent of the nation's domestically



produced oil and 23 percent of its natural gas. Forecasts show the Gulf of Mexico will experience a 34 percent growth in oil and gas production from 2013 to 2015. This growth will occur offshore in deep water, and will be supported by the world's most technically sophisticated fleet of drilling, production and support vessels.<sup>5</sup>

### Oil & Gas Production from Inland Fields

In both the U.S. and in Canada, advances in directional drilling and hydrofracturing have led to significant increases in oil and gas production from inland fields. Natural gas in the lower 48 states,

Figure 2– Demonstrates natural gas and crude oil production increases by geographic sector (inland and Gulf of Mexico).

<sup>2</sup> U.S. Energy Information Administration: International Energy Statistics – Production of Crude Oil, NGPL and Other Liquids

<sup>3</sup> American Chemistry Council; <http://www.americanchemistry.com/Policy/Energy/Shale-Gas/Fact-Sheet-US-Chemical-Investment-Linked-to-Shale-Gas-Reaches-100-Billion.pdf>; Accessed June 2014; February 2014; **U.S. Chemical Investment Linked to Shale Gas Reaches \$100 Billion**; Remarks: The American Chemistry Council is the trade association for the U.S. Chemical Industry and its stated goal is to advocate on behalf of its client interests.

<sup>4</sup> Bureau of Ocean Energy Management; <http://www.boem.gov/Sale-231-Stats/>; Accessed June 2014; 19 March 2014; United States Department of the Interior; **Sale Number 231: Sale Day Statistics, Gulf of Mexico OCS Region**; Remarks: It is key to note here that while 90 percent of the value of bids were in deepwater, 34 percent of the total land auction was in water less than 200 meters in depth. These shallower areas are where smaller independent producers are focusing their attention.

<sup>5</sup> U.S. Energy Information Administration Short Term Energy Outlook; <http://www.eia.gov/forecasts/steo/query/>; Accessed 29 September 2014.

excluding the Gulf of Mexico, is forecasted to increase 32 percent between 2010 and 2015. Likewise, crude oil production in the lower 48 states, excluding the Gulf of Mexico, is projected to increase 122 percent between 2010 and 2015.<sup>6</sup>

## Implications for the Marine Transportation System

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The U.S. Marine Transportation system consists of ocean, coastal, and inland waters, ports, vessels facilities, and intermodal connections. It services commercial, military and recreational users, and as a source of seafood, drinking water, feed water, recreation, intermodal shipping, and transportation, is vital to the national economy and security. Nearly 74 percent, by weight, of all U.S foreign trade and 78 percent, by weight, of U.S. merchandise trade moves on the MTS. According to the U.S. Department of Transportation's Bureau of Transportation Statistics, the total value of marine freight is predicted to increase by 43 percent domestically and 67 percent internationally between 2010 and 2020.<sup>7</sup> The MTS is particularly well suited for transportation of bulk energy products and will be increasingly relied on to move product from well head to refinery, and from refinery to point of consumption.

The Coast Guard is responsible to facilitate safe, secure, and lawful trade, travel, recreation, and other uses of the MTS while preventing and protecting against attacks to MTS infrastructure or use of the MTS for illegal activities. We do this by: establishing aids to navigation in federal waterways; implementing traffic management measures as needed; setting and ensuring compliance with safety, security, and environmental standards; providing risk based protection to facilities, vessels, and activities; and responding to and investigating accidents and incidents to mitigate the consequences and ensure accountability. As demands on the MTS grow to meet the needs for energy production and transport and to sustain growth in trade of all goods, demands on the Coast Guard will grow as well. Particularly challenging will be the increase in number and complexity of vessels exploring, exploiting, and producing oils and gas on the OCS; the increase in the number of barges and small tank ships moving oil and gas products between and within our ports; the advent of large liquid natural gas (LNG) and LHG export facilities that will serve hundreds of foreign flag tankers each year, and the development of gas fueled vessels and the associated infrastructure; and preparing for and responding to spills of unconventional products in both highly populated and remote locations.



### Increase in Outer Continental Shelf (OCS) Rigs and Supply Vessels

To support oil and gas production, the Gulf of Mexico will experience a 30 percent growth in the number of Outer Continental Shelf (OCS) rigs by 2016. These drilling and production rigs support

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<sup>6</sup> U.S. Energy Information Administration Short Term Energy Outlook; <http://www.eia.gov/forecasts/steo/query/>; Accessed 29 September 2014.

<sup>7</sup> CMTS, "Why the MTS Matters" <http://www.cmts.gov/Background/Index.aspx>; Accessed 29 September 2014.

vessels are technically state-of-the-art, and continue to increase in size and complexity as oil and gas fields move to the farthest reaches of our outer continental shelf in waters over 9,000 feet deep. There is no persistent governmental presence that far offshore which presents significant logistical and technical challenges to the Coast Guard for the conduct of safety, security, and environmental compliance inspections, search and rescue operations, and response to spills and other incidents. In addition, new construction of both production rigs and the three or four supply vessels to support each significantly challenges the Coast Guard capacity for technical plan review, on-site inspection, and oversight of authorized third party performance of similar functions.

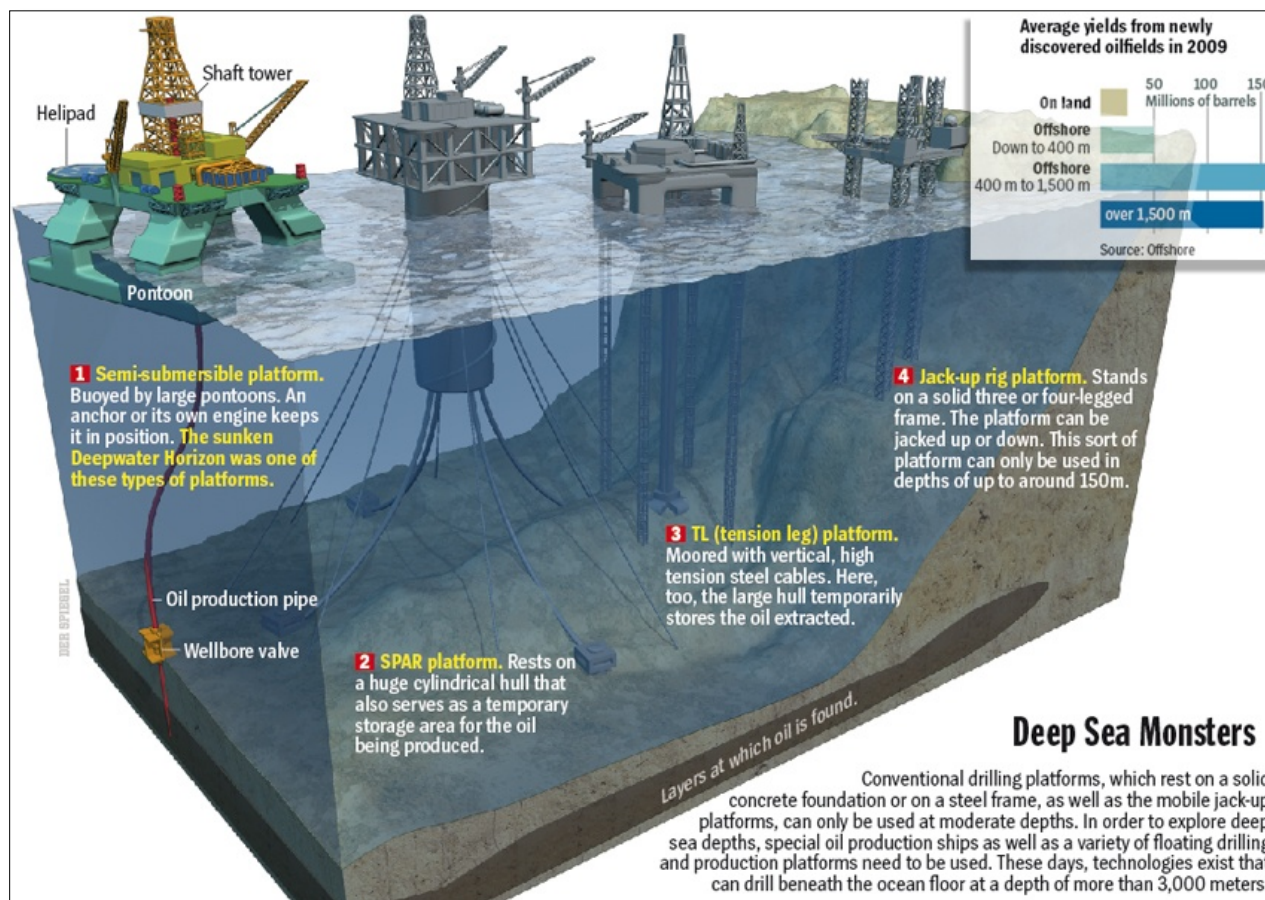


Figure 3 - Demonstrates increasing complexity as rigs go further offshore<sup>8</sup>

## A Growing U.S. Flagged Tanker and Tank Barge Fleet

Maritime transportation is a reliable method of delivering liquid hydrocarbons, which is second only to pipelines in terms of volume delivered. The recent shifts in the market have transitioned the movement of oil away from large foreign flagged import tank vessels that spend a small portion of their transit in U.S. waters. Instead, hydrocarbon shipping utilizes significantly smaller vessels, making shorter, higher frequency trips, seldom leaving U.S. waters. In 2013, 40 percent of total crude oil reaching U.S. refineries arrived by maritime conveyance.<sup>9</sup> While the total amount of crude oil moving by water is

<sup>8</sup> <http://www.spiegel.de/international/business/bild-694346-87425.html>

<sup>9</sup> U.S. Energy Information Administration, Form EIA-820, "Annual Refinery Report," Table 9., released January 1, 2014, <http://www.eia.gov/petroleum/refinerycapacity/table9.pdf>

down due to declining foreign imports, the amount of domestic crude moving through the MTS rose by more than 50 percent since 2008.<sup>10</sup>

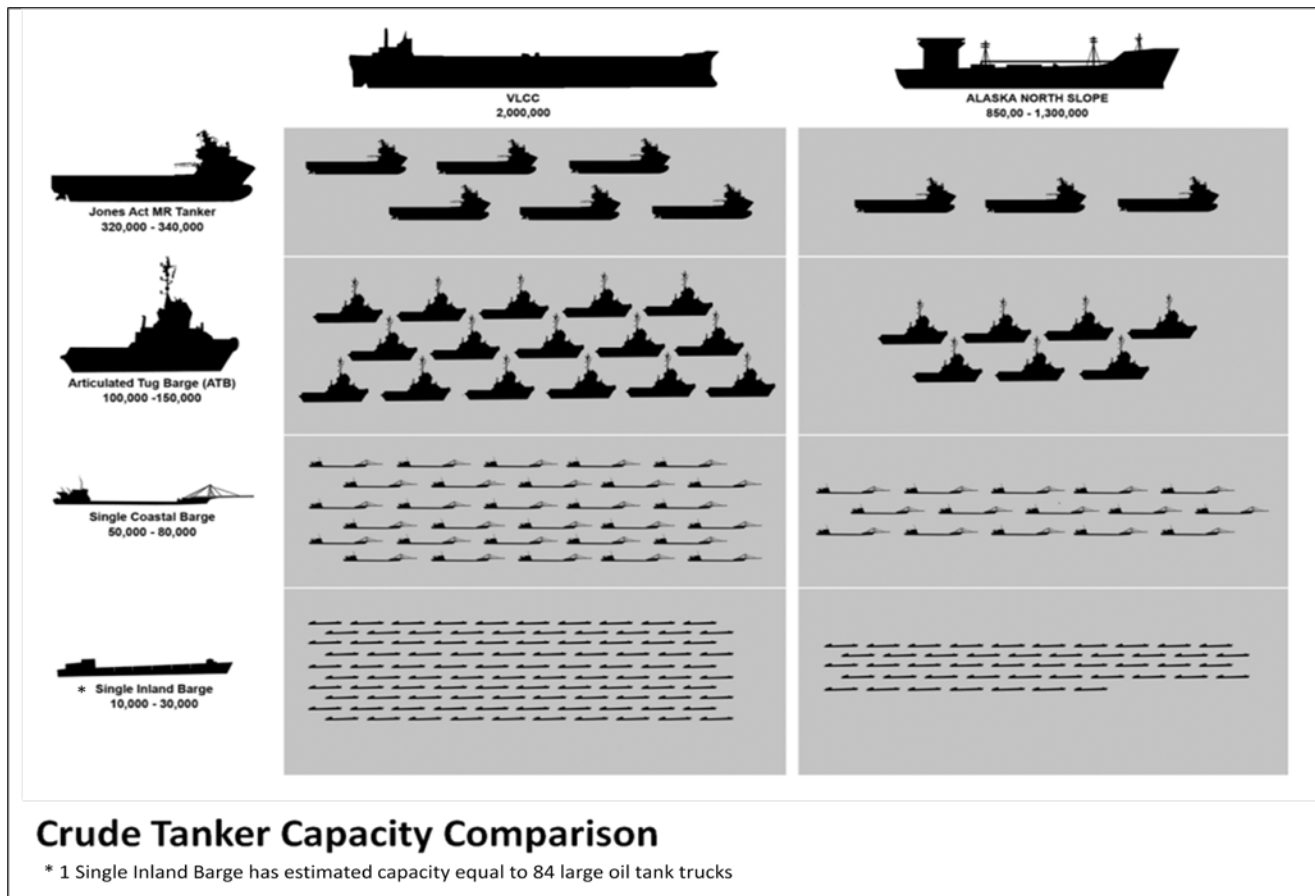


Figure 4 - Chart shows the number of smaller domestic tankers and barges (left axis) required to transport the same quantity of oil transported by large import vessels (top axis).

To accommodate this increase in demand, the U.S. inland tank barge fleet added a record 261 vessels in 2012. The following year in 2013, U.S. shipyards delivered 336 inland tank barges<sup>11</sup>, a 29 percent increase. There are also 15 U.S. flagged coastal product tankers on order across the country, a significant reversal from decades of decline. All vessels engaged in the domestic trade must be U.S. flagged and certificated by the U.S. Coast Guard. All facets of vessel design, construction, crewing, permitting, security, and operation are overseen by the U.S. Coast Guard. In addition, the growing fleet congests already busy coastal, Great Lakes, and inland waterways, increasing the risk of collision, allision, grounding, or environmental incident. Increased reliance on the Great Lakes and northeastern rivers for energy transport to heavily populated areas will require timely and reliable Coast Guard ice breaking services in winter months. The U.S. Coast Guard must be ready to meet the increasing regulatory and incident response demands created by the growing U.S. shipping fleet.

<sup>10</sup> U.S. Energy Information Administration, Form EIA-820, "Annual Refinery Report," Table 11, released January 1, 2009, <http://www.eia.gov/petroleum/refinerycapacity/archive/2009/table11.pdf>

<sup>11</sup> Bruce Buls; "Crude oil transport spurs tank-barge construction;" WorkBoat.com; 01 April 2014; <http://www.workboat.com/newsdetail.aspx?id=23974>

## Changes in Natural Gas Transport

The changes in the natural gas market and drop in domestic prices have left most of the capacity of the eleven existing LNG import terminals idle. Now nearly all of these plants have submitted proposals to export domestically-produced natural gas. To date, three plants have received full approval and five have received conditional approval. At full operating capacity, these eight terminals could export a volume of LNG five times greater than the total volume transiting the MTS in 2012. Current Coast Guard policy designates LNG and some LHG vessels as Select Certain Dangerous Cargo (CDC) vessels and requires armed Coast Guard vessel escorts through designated key port areas. As increases in exports continue, the Coast Guard's current escort mission requirement will steadily increase.



Low natural gas prices combined with new vessel emissions standards are also driving the maritime industry to explore the use of LNG and LHG as an alternative maritime fuel. Multiple companies are constructing and converting vessels to run on LNG. Harvey Gulf has already broken ground on a new LNG bunkering facility to support a small fleet of dual-fuel offshore support vessels. This market is expected to develop in the Gulf Coast and extend to other parts of the country as well. Additionally, new construction and conversion of vessels to run on LNG will require development of Coast Guard

policy and regulations to ensure vessels are designed for safe and secure operations in U.S. waters.

## Challenges for Oil Spill Preparedness and Response.

Bakken crude and Canadian tar sands oil (bitumen) poses the most immediate challenges for oil spill preparedness and response. Lab testing of Bakken crude shows it is lighter than most crude produced in the United States. While the crude dissipates faster in water, it presents an increased risk of fire and exposure due to flammable vapors. Bitumen is blended with a diluent for transportation, creating a lighter product called dilbit. The diluents typically evaporates faster, which combined with certain environmental conditions, can increase the density of the spilled dilbit and the risk of sinking and submergence as the spill progresses. While manageable, these differences add yet another layer of complexity to Coast Guard response operations.



The changes in methods and types of oil production will impact the decisions response personnel make in the field to respond and recover from a discharge of these products into the marine environment. High pressure, high temperature drilling operations require greater oversight and cooperation between responsible Coast Guard operational commands, as well as enhanced response preparations for the greater worst-case discharge potentials. Unconventional oils challenge current prevention and response methodologies and pose new risks that the Coast Guard must address. In light of the above, it is likely that Area Committees will need to undertake an evaluation of the sufficiency of current emergency response plans in order to assess what changes are necessary.



# Responding to Evolving Demands

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The U.S. Coast Guard will continue to facilitate the national economy by ensuring safe, secure, and environmentally responsible maritime activity. This requires a comprehensive response to assess and meet the evolving demands of the energy sector within the offshore, coastal, Great Lakes and inland zones. Industry activities include ship design and construction; offshore exploration, production, and services; transportation of liquid hydrocarbons via the MTS; and the construction and operation of new terminals primarily along the Gulf Coast and into the Mid-West. The Coast Guard will focus our efforts on: **Prevention, Preparedness, and Response.**

**Prevention:** The U.S. Coast Guard will adapt its regulatory frameworks, enhance its technical competency, and develop the workforce capacity – specifically marine inspection, investigation, and waterways management personnel - to account for new vessel designs and operations, modified waterfront facilities, and increased vessel traffic on the inland waterways. In addition, there will be greater requirements to inspect off shore and ultra-deepwater outer continental shelf (OCS) activities. The Coast Guard will also re-examine current risk and escort policy of LHG and LNG vessels.

**Preparedness:** Increased transportation of gas and oils over and along waterways by multiple transportation modes presents additional and new risks that must be considered in contingency plans, preparedness activities, and industry verifications. The Coast Guard has begun to focus on additional research and response regime development in non-floating oils, new personnel training and qualification, new certification standards for the marine industry, and additional marine inspection, environmental response, and maritime security personnel to meet increasing demands.

**Response:** Innovative technologies as well as an increase in Group V (sinking) oils may dictate changes to current national response policy for oil spills. To assess these new challenges, the Coast Guard will work with oil spill removal organizations (OSROs) to develop new guidelines for Group V oils and modify response requirements. The increased potential for LNG releases will necessitate an increased degree of response coordination with the marine industry.

These three priority areas will capitalize on the U.S. Coast Guard's authorities, capabilities, competencies, and partnerships, while leveraging the knowledge and capabilities of our stakeholders to ensure the United States has safe, secure, and resilient waterways to meet the needs of the 21st century global economy.

## Guiding Principles

This response to the evolving energy sector is based on the following DHS Strategic Goals and USCG Commandant's Direction:

- Safeguard and Expedite Lawful Trade and Travel
- Mitigate Hazards and Vulnerabilities
- Strengthen National Preparedness and Resilience.
- Continue to invest in the 21<sup>st</sup> century Coast Guard.
- Enhance partnerships with stakeholders in the maritime community.
- Ensure efficiency across all Coast Guard activities through effective planning and sound risk management.
- Enhance unity of effort through operational planning, logistical support, and execution with DHS, DOD, and other partners.

# Prevention

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The United States' domestic energy sector's expansion is predicted to have a ripple effect throughout the inland, Great Lakes, coastal, and offshore maritime industry. Given current trends in vessel and facility construction activity, it is likely that a larger, U.S.-flagged coastwise, trade tanker and barge fleet will emerge. These smaller (i.e., non-VLCC) vessels will make more frequent transits in coastal and inland waters, adding marine traffic to already congested waterways. With a greater number of vessels engaged in shorter distance, higher frequency transits, there will be a greater risk of collisions, allisions, and groundings, with increased potential for pollution incidents and greater maritime security risk. Also, in response to stricter requirements to control air emissions from vessels and the availability of relatively inexpensive LNG, there is significant industry interest in building new vessels that

use LNG as a marine fuel for propulsion and power generation, or converting existing diesel powered vessels to use LNG. If significant expansion in LNG powered vessels occurs, shoreside support infrastructure will likely expand for the purpose of providing bunkers to fuel these vessels. This could take the form of construction and operation of LNG bunker barges, transfer of fuel from storage tanks at shoreside facilities, or use of tank trucks or rail cars as mobile fueling sources. Much of this activity will occur in the Eighth Coast Guard District AOR, but there will also be evolving energy activity in non-traditional port areas such as Albany, NY which may present unique challenges during heavy ice years.

In light of the above the U.S. Coast Guard will:

- Examine existing regulatory framework to position the Coast Guard to address the challenges associated with offshore exploration and production, LHG and LNG bunkering, vessel design, and crew training/certification requirements. Continue to support domestic and international standards making bodies, such as the International Maritime Organization, in development of requirements for LNG-fueled vessel design and LNG vessel bunkering procedures.
- Review its existing technical capabilities and seek appropriate remedies in order to meet the strategic complexities - deeper drilling, farther offshore, and greater production and transportation rates - envisioned in the evolving energy sector.
- Review its service-wide personnel training curricula and develop updated Personnel Qualification Standards that establish vessel and facility inspection requirements and provide job aids to marine inspectors.
- Re-assess the risk posed by LNG and LHG to the key port areas it transits; and revisit whether or not, such risk warrants armed escorts, or can be more appropriately mitigated by other means.
- Develop a new policy and concept of operations (CONOPS) to facilitate a safe and secure MTS including Aids to Navigation (ATON), waterways management, vessel traffic management, maritime domain awareness (particularly on the Western Rivers). Leverage existing and emerging technology to maximize mariner safety while optimizing the balance between electronic and physical ATON. To attain this balance, the Coast Guard will seek stakeholder engagement through aggressive outreach; use updated, data driven analysis tools; increase availability of marine safety information; and promulgate updated carriage requirements for vessels.

# Preparedness

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The energy renaissance requires evaluation of current spill contingency plans to ensure risks resulting from changes in energy production and transport are properly addressed. A renewed emphasis on partnerships and interagency collaboration will be necessary to develop response strategies to minimize harm to human health and the environment. Robust training and exercise programs need to be adapted to changing risk profiles to ensure first responders are prepared. Long term investments in our preparedness capacity will be necessary to develop a robust corps of highly trained and experienced preparedness specialists with the expertise to develop comprehensive response plans and ensure compliance with a myriad of federal and state environmental laws.



In light of the above, the U.S. Coast Guard will:

- Continue to strengthen partnerships with the Environmental Protection Agency, and the Departments of Commerce, Transportation, Energy, and Interior in concert with other National Response Team agencies to facilitate an integrated federal effort in advanced planning for new energy production and transportation.
- Continue to invest in personnel and training to strengthen its cadre of preparedness specialists at all levels of the organization and provide them the tools needed to effectively leverage resources across local, state, and federal government and the private sector, harmonize the diverse family of contingency and response plans, develop preparedness measures, and implement strategies necessary to mitigate the effects of oil spills and hazardous substance releases.
- Evaluate and upgrade the command, control, communications, and sensors necessary for shore-based incident response to ensure the Coast Guard is technologically prepared to meet the increasing demands of this mission in the 21st century.
- Coordinate with federal agencies, non-governmental organizations, academia, international partners, and the private sector to further advance response-related research and development associated with new forms of energy that may affect U.S. waters to inform preparedness and response activities.
- Continue to engage federal, state, and local stakeholders to review and, if necessary, update existing Area Contingency Plans, Area Maritime Security Assessments, Area Maritime Security Plans, and preauthorization agreements to reflect new risks associated with increased oil production and new transportation modes.
- Engage with Department of Commerce and the Department of the Interior to identify sensitive marine environments, threatened and endangered species, and ensure compliance with federal consultation laws. The Coast Guard will continue to work with these and other partners to integrate other consultation requirements into spill planning and response structures.

# Response

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Major environmental incidents, such as the Deepwater Horizon oil spill, the Paulsboro, New Jersey train derailment, and Hurricane Sandy underscore the importance of having well-trained and readily deployable incident management and pollution response professionals. Equally important is a strong regulatory framework that ensures the right private sector resources are available to respond expeditiously, complementing federal, state, and local capacity and ensuring unity of effort. Small unit



sizes, large distances, and limited oil spill removal organization (OSRO) resources along new and emerging transportation corridors, particularly on the Western Rivers and Great Lakes, present significant response challenges for On-Scene Coordinators and will require Coast Guard attention to ensure response industry adaptation to changing transportation patterns. Further exacerbating these shortfalls is the lack of clear regulatory requirements for Group V (sinking) oils, which degrades response plan efficacy and presents an incomplete picture of industry readiness. Moreover, increased domestic energy production and exportation, particularly LNG, will require additional security resources and

innovative means to mitigate risk to ensure the safety and security of the public and maritime response personnel.

In light of the above, the U.S. Coast Guard will:

- Continue to evaluate its incident management, pollution response, and maritime security and response capacities in areas of new oil and gas production and transportation to ensure resources are poised to respond to areas of increased risk.
- Develop new OSRO classification guidelines for Group V oils to ensure capability of private sector response equipment and strengthen government and industry response plans.
- Coordinate with partner agencies, the private sector, and academia to develop a more comprehensive understanding of the fates and effects of new oils, such as Bakken crude and Canadian tar sands (bitumen), and related response technologies to enhance existing environmental response training programs.
- Coordinate with international partners to ensure readiness for transboundary responses resulting from increased international or domestic energy production.
- Coordinate with marine industry, i.e., LHG and LNG vessel and facility owners and operators to ensure capability of private sector response equipment and strengthen government and industry response and security plans.
- Enhance response preparedness tools like the Response Resource Inventory and Preparedness Assessment Visits to further align response plans with industry capabilities and provide On-Scene Coordinators with a common operating picture for response equipment readiness.